‘Mother of pearl’ clouds enthrall skywatchers

Description

Over the past few days, conditions in the upper parts of the atmosphere have allowed us to be treated to a rare glimpse of Nacreous Clouds.

What are they?
Found in the lower stratosphere, these clouds are mainly seen over polar regions in winter, where very cold air – minus 80?C and lower – condenses the small amount of water vapour present into tenuous clouds. These clouds are normally found at altitudes of around 20 km.

Compared to the water droplets in clouds we see every day in the troposphere, the water droplets which make up Nacreous Clouds are much smaller. Their smaller size means that the way in which they scatter light is different to regular clouds. This gives them their characteristic pearly luminescence, and has led to them sometimes being known as ‘mother of pearl’ clouds.

Nacreous clouds are best seen in the twilight hours, just after sunset and just before sunrise, when the clouds are illuminated by sunlight from below the horizon.

> More of those crazy clouds this morning #nacreousclouds #northumberland #StormHenry pic.twitter.com/bfeIEzr1jb
>
> — Anita Nicholson (@AnitaNicholson) February 2, 2016

How rare are they?
As these clouds are more usually seen over the polar regions in winter, it is quite rare to see them as far south as the UK. We usually get to see them for short periods of several days every few years.

> #NacreousClouds taken from #Tweedmouth #Berwick this morning @liamdutton @Ross_Hutchinson @Schafernaker pic.twitter.com/wutt6pYoiB
>
> — Danny Spring (@strangequark77) February 2, 2016

Why are we seeing them now?
Currently, we are able to catch sight of them because cold air which usually circulates around polar regions in the stratosphere (the stratospheric polar vortex) has been displaced from its usual position over the north pole to be over the UK.

> Stunning shots of the #nacreousclouds over #Kildare #Ireland taken by @GinghamSkyPhoto this morning. pic.twitter.com/wH8oPqwm5H
>
> — Kildare Weather (@LiveNaasWeather) February 2, 2016

How much longer will we be able to see them?
Our weather forecast models indicate the cold polar vortex will remain nearby for the next few days, so we should be able to see Nacreous Clouds when the skies are clear. The position of the vortex shifts towards the end of the week taking the coldest air, and the Nacreous Clouds, away from above the UK.

These clouds are not to be confused with Noctilucent Clouds, which occur much higher up in the mesosphere – near altitudes of 85 km – and in the summertime.

Date Created
February 2016

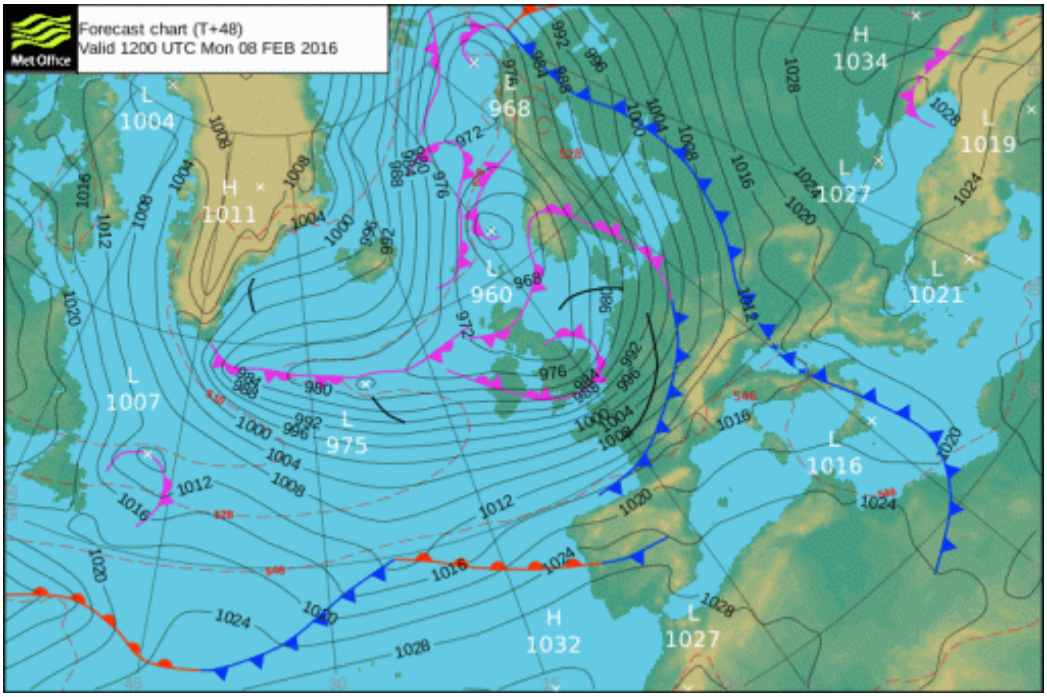
Storm Imogen brings gales to southern areas of Britain

Description

An area of low pressure, which will bring some very strong winds across southern parts of the UK as it moves eastwards on Monday, has been named as Storm Imogen.

Gusts of 60-70 mph are possible in southern England and parts of south Wales with 80 mph gusts possible in exposed coastal districts. Some very large waves are also likely along some coasts, especially along the north coast of Cornwall and Devon.

The Met Office has today (Sunday 7 February) issued an Amber “be prepared” National Severe Weather Warning for for wind for Storm Imogen which is valid from 3 am until 6 pm on Monday. There is also a larger Yellow “be aware” Severe Weather Warning for wind valid from 3 am to 6 pm on Monday.



Surface Pressure Chart Monday 8 Februrary

There remains some uncertainty just how far north and east the strongest of the winds will extend. However, you can keep up to date with the latest for your area using our forecast pages and by checking the Severe weather warnings.

Storm Imogen follows Storm Henry, which passed close to the north of Scotland through Monday 1 February 2016 into Tuesday 2 Feb.

Winds are expected to ease through Tuesday leading to a short drier, quieter and colder interlude for many on Wednesday before more wind and rain follows later in the week.

Date Created
February 2016

Looking down on the weather: a brief history

Description

Today we can be inclined to take rocket launches for granted, says Dr Simon Keogh who leads the Met Office Satellite Data Products and Systems group in the first of a series of blogs on satellites. There was once a time, he adds, when every blast off to the heavens captured the public's imagination. Families would be glued to TV sets to see the latest episode in the unfolding drama of mankind probing the universe. These days, launches happen so frequently they barely get a mention in the press: unless of course there is a significant incident or the mission happens to be carrying an important payload, such as Britain's heroic astronaut Tim Peake.

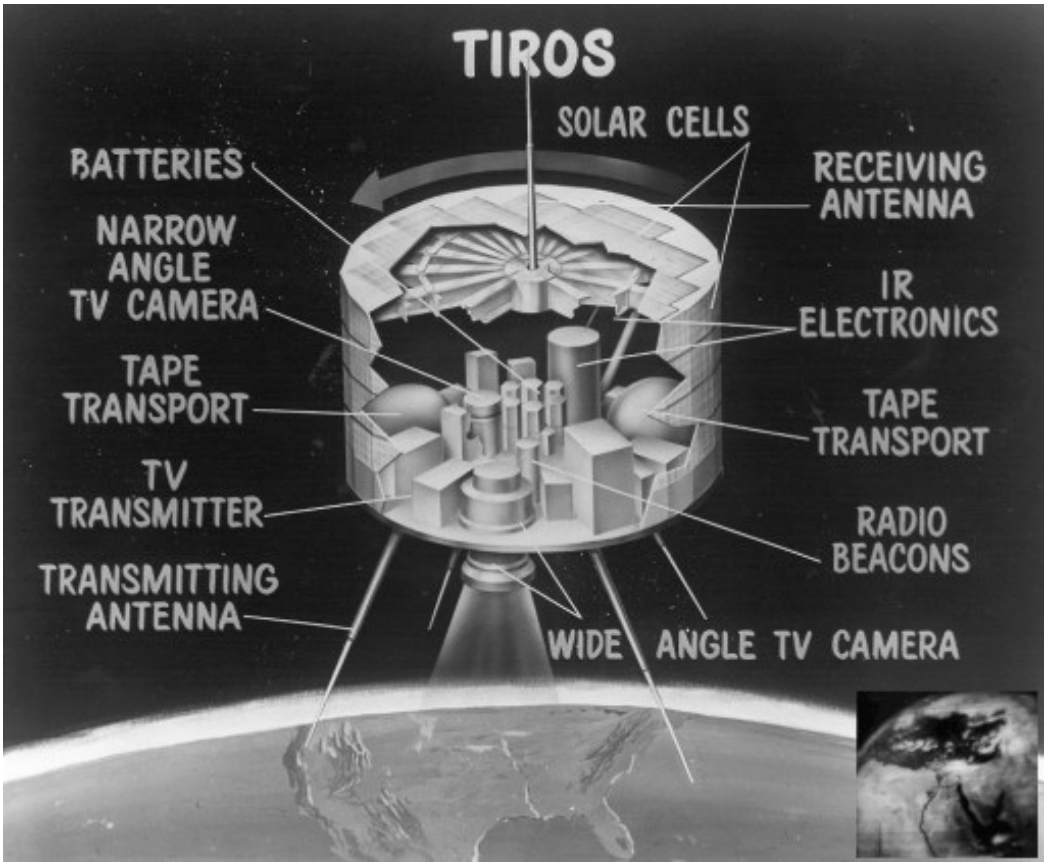
A modern satellite launch. S-NPP weather satellite blasts off in 2011 (courtesy of NASA).

We may have taken the launches for granted, but we mustn't overlook the role that space missions and satellites play in our everyday lives. From communications and weather observation to GPS satellite navigation on your smartphone. This technology has revolutionised our existence and it is fundamental to our everyday lives.

From a meteorological point of view, satellites have given us a new insight into the world's weather and climate.

The TIROS-1 satellite was launched way back in 1960 but operated for only a mere 78 days. Although its useful life was extremely brief, it was a glorious time and the mission was widely deemed to be hugely successful. The first imagery that came back marked the dawn of a new era in Earth observation. Never before had scientists had the ability to monitor large storms on their way to make

landfall.



The TIROS-1 satellite's technology enables it to capture detailed images of the earth, such as the view of Nile (inset). Picture courtesy: NASA

It was suddenly apparent to the world's scientists that if only there were enough of these satellites then perhaps it would be possible to evacuate towns in the path of severe weather, saving lives and livelihoods in the process. This truly did seem at the time to be the most promising societal application for space technology – and so it has arguably continued to be. As basic as the TIROS-1 satellite was, its impact has clearly inspired a long-lasting boom in the construction of satellites for monitoring our changing weather.

If you'd like to know more about the legacy of TIROS-1 and the constellation of satellites we have today, then look out for our week-long series on satellites.

Dr Simon Keogh leads the Met Office Satellite Data Products and Systems group. He is a member of a United Nations WMO expert team on Satellite Utilisation and Products and is the UK delegate to EUMETSAT's Operations Working Group.

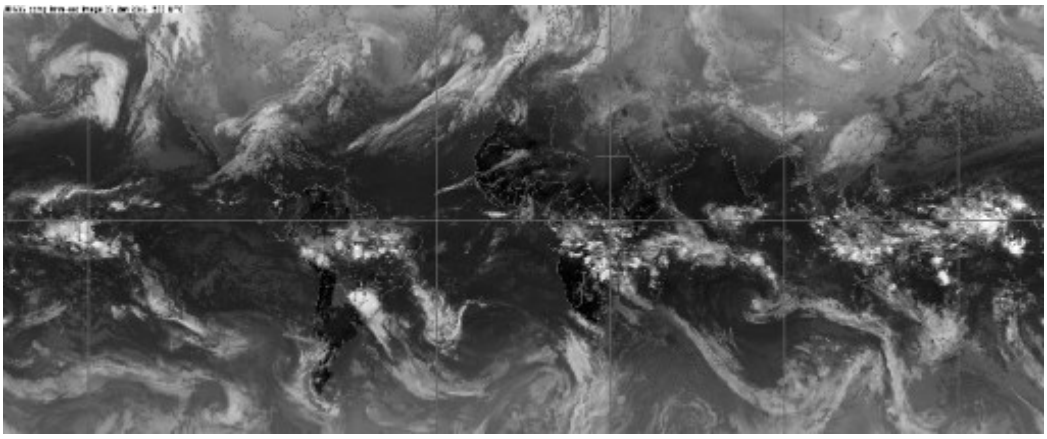
http://www.metoffice.gov.uk/research/people/simon-j-keogh

Date Created
February 2016

A man-made constellation in the night sky

Description

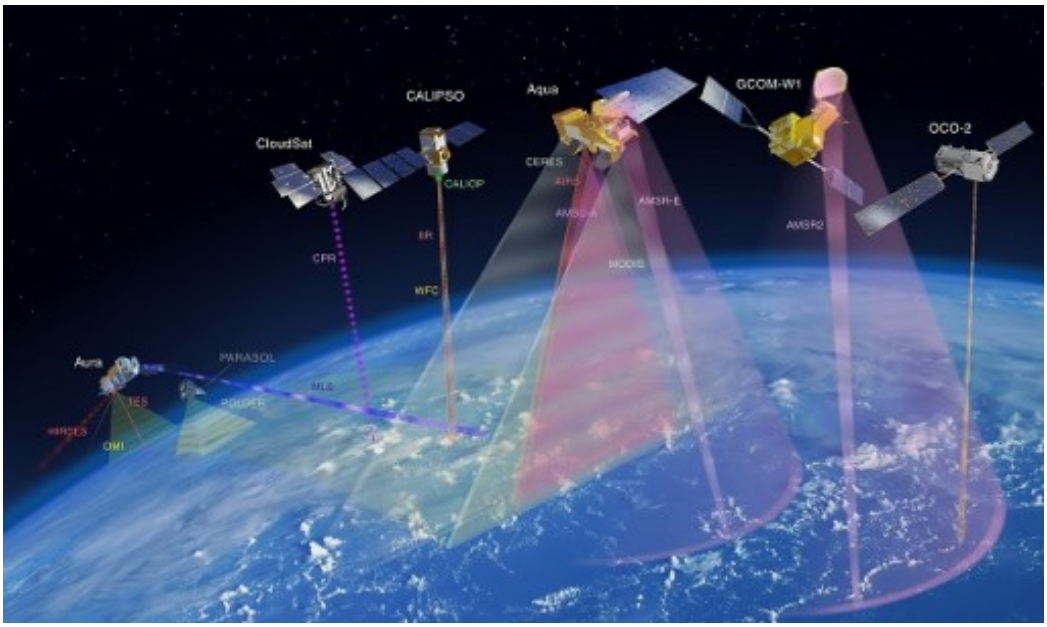
Thanks to a ring of satellites operated by Europe, USA, Japan, China, India, Russia and South Korea we now have large-scale coverage of the Earth and an insight into how our complex weather patterns are changing hour-by-hour, day-by-day and year-by-year, says Dr Simon Keogh who leads the Met Office Satellite Data Products and Systems group. This is the second part of Simon's blog series on satellites, which began yesterday.



Global composite image made from European, American and Japanese geostationary satellite imagery.

To space experts a major group of satellites are known as geostationary, because they appear to be stationary in the sky, always staring down at us from the same position day and night. However, they are way up at about 36,000km (22,000 miles) above the Earth, so there are limitations on how much detail they can resolve from such a great distance. Nevertheless, these satellites are considered to be the workhorse satellites of the modern meteorologist, giving a panoramic view of what's happening with our changing weather nearly everywhere on Earth – apart from over the poles.

Complementing this ring of geostationary satellites are many polar-orbiting satellites. These polar-orbiting satellites circle the Earth at a height of around just 705km (438 miles) and, as their name suggests, can provide detailed observations of the polar regions as well as other parts of the globe. They're very much closer to Earth than geostationary satellites, which mean they can also be used to take close-up measurements of the atmosphere, revealing its detailed three-dimensional structure.



The A-Train of satellites (image courtesy of NASA).

One particular example of these polar-orbiting satellites is the ‘A-train’ of satellites operated by NASA. Each of these satellites orbit in quick succession, just a few minutes apart. Each satellite in the train yields a complementary view when compared to its successor and predecessor.

Tomorrow, the next post in Simon’s four-part series will examine the impact of weather satellites on our safety and security.

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Date Created
February 2016

Without satellites, would forecasting regress to the 1970s?

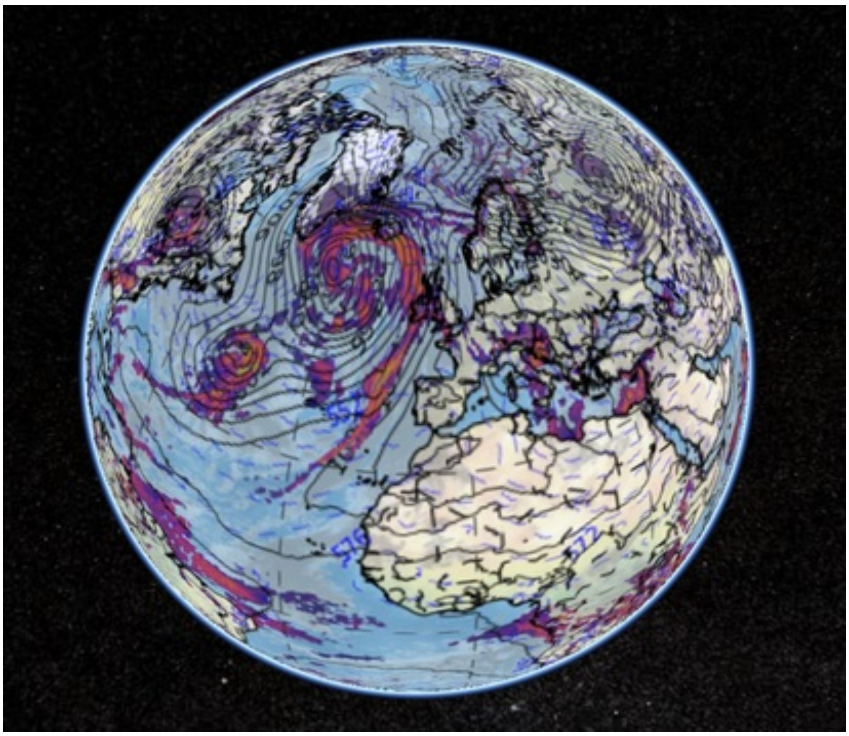
Description

The 1970s may be memorable for many things, but the accuracy of weather forecasting wouldn’t make the shortlist, says Dr Simon Keogh who leads the Met Office Satellite Data Products and Systems group with the third post in a four-part blog series about satellites.

Back in those days the accuracy of forecasts was far behind what can be achieved today, largely thanks to our modern-day constellation of sophisticated weather satellites.

We can’t feel too smug compared to our 1970s colleagues, though, because much of the modern forecast accuracy we take for granted today, would evaporate if we didn’t have our precious weather satellites.

Meteorologists use a process of data assimilation, where recent observations of the atmosphere are used to drive computer models to make predictions about how the atmosphere will change in future.



Global forecast map made from Met Office computer model output.

A fundamental principle of computer modelling is that the models are only as good as the data you put into them. What this means is that if the observations you put in to drive the model aren’t accurate enough or aren’t complete enough then the effect is like putting contaminated fuel into a sports car: you won’t get the best performance. The same happens with weather models. If the observations that

go in aren't accurate enough, or complete enough, then the model runs out of 'skill' quite early, potentially providing useful forecasts only hours ahead instead of days ahead as we've come to expect.

That's important because society needs as much notice as possible to respond to severe weather emergency services. Sandbags need filling, personnel need putting on rota and people and equipment may need to be drafted in from other parts of a country to shore up weak spots in defences that severe weather might exploit. All this takes time and severe weather warnings are crucial in buying time for the emergency services. Without these timely warnings the snowploughs, helicopters, fire engines, sandbags and brave emergency workers won't be where you need them, or when you need them.

The next blog in this series, tomorrow, describes how you can spot weather satellites for yourself in the night sky.

Dr Simon Keogh leads the Met Office Satellite Data Products and Systems group. He is a member of a United Nations WMO expert team on Satellite Utilisation and Products and is the UK delegate to EUMETSAT's Operations Working Group.

Link to my page on the research pages: http://www.metoffice.gov.uk/research/people/simon-j-keogh

Date Created
February 2016

Keep your eyes peeled for eyes in the sky

Description

On a clear night, when looking up at the heavens, it may be tempting to imagine that those little lights in the night sky are just stars, planets or aircraft, says Dr Simon Keogh, in the latest of a series of blogs on satellites. Dr Keogh leads the Met Office Satellite Data Products and Systems group

However, he adds, some of these lights in the sky are actually satellites. There are rather a lot of them up there and they're not only there for weather forecasting. In the early morning or evening you can sometimes spot polar-orbiting satellites drifting slowly overhead. They appear as a small speck of light that moves from horizon to horizon over a period of a few minutes. The light you can see is actually sunlight being reflected off the large solar panels that the satellite relies upon for power. This light is sometimes referred to as a "flare".

Photo (courtesy of NOAA) of the International Space Station tracking across the sky at night.

The International Space Station (ISS), Tim Peake's new and temporary home, is perhaps the most well-known satellite, orbiting the Earth at an altitude of around 435km (270 miles). The flare from the huge solar panels on the ISS make it reasonably easy to spot in the night sky.

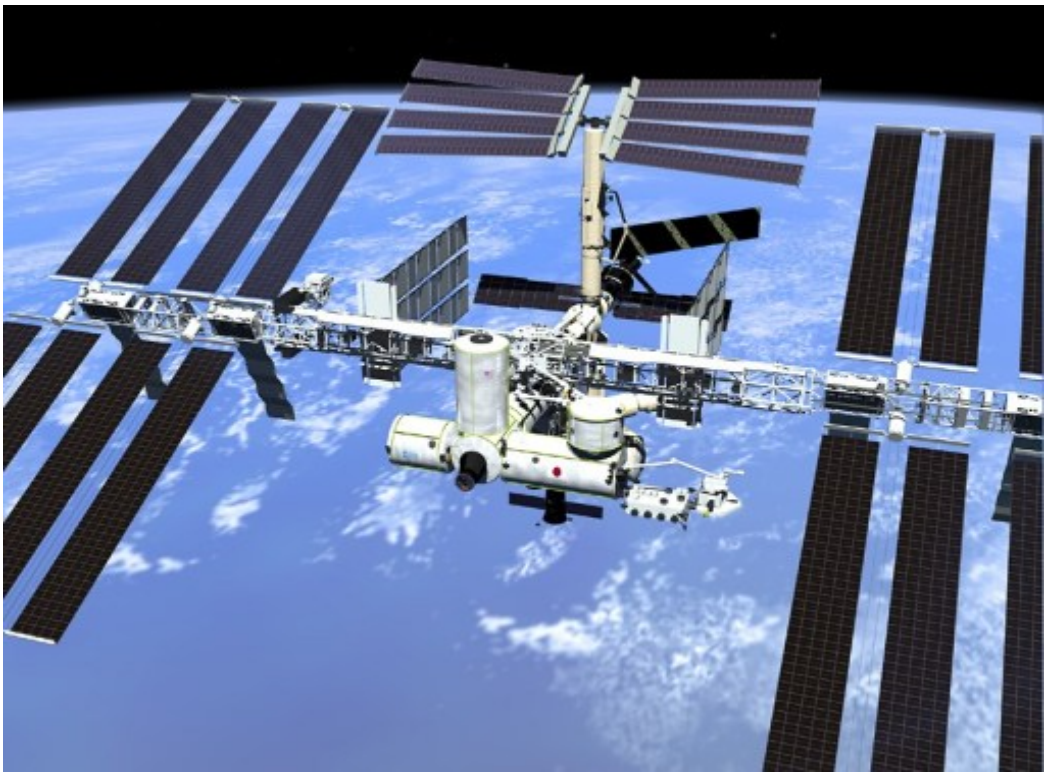
Interestingly, in recent times the ISS has even been contributing valuable information on ocean surface winds from the RapidScat instrument, which is great for marine weather forecasting applications. We very much hope that RapidScat continues to work well and that it never needs attention from Tim or the other ISS astronauts.

We take these satellites for granted, but we shouldn't. Thanks to weather satellites we have accurate forecasts and timely warnings to help us prepare for the worst the weather can throw at us. Without

weather satellites, we'd be living in a world where the next flood, the next heat wave and the next storm surge would come without warning with potentially disastrous consequences.

Fortunately, the Met Office is an active participant in the design of many future satellite missions so we look forward to having weather satellites around for a long time to come.

Working with colleagues internationally, we make sure that the needs of the UK for satellite data are represented on a global stage. If you want to find out more about weather satellites and what we do with them in the Met Office then please visit http://www.metoffice.gov.uk/learning/first-steps/observations/satellites



The International Space Station is relatively easy to spot as it is the second brightest object in the night sky (after the moon), and orbits the earth around 16 times each day. Picture courtesy: NASA.

To see the ISS for yourself please visit the following website for details: http://spotthestation.nasa.gov

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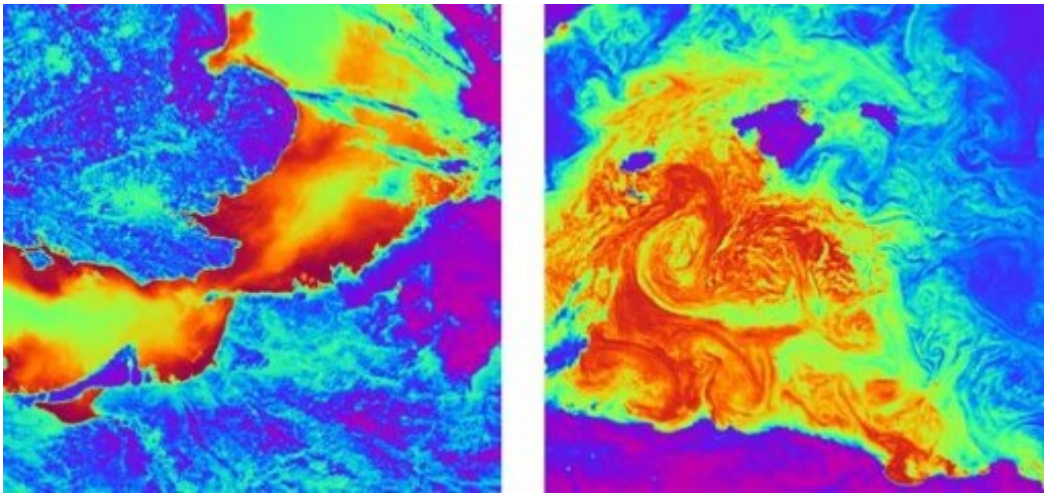
Date Created
February 2016

Sentinel-3: A new window on the changing state of our oceans

Description

Climate change is much discussed, says Dr Simon Keogh of the Met Office, and to inform the conversation the Met Office uses historical scientific data including sea-surface temperature records, based on data from the Along Track Scanning Radiometer (ATSR) series of satellite instruments. These instruments, designed and built in the UK, provided accurate infrared measurements of the Earth's thermal emissions – including the heat signature emitted by the world's oceans – until the untimely demise of ESA's ENVISAT satellite in April 2012. Since the loss of ENVISAT, scientists have been eagerly awaiting ESA's Sentinel-3 mission and hoping that it will provide high-precision data that will continue the ocean temperature record begun by ESA's earlier satellites.

This post coincides with today's Sentinel-3 mission launch which will be carrying the most sensitive instrument to measure sea-surface temperatures for many years. This instrument is known as the Sea and Land Surface Temperature Radiometer or SLSTR and it has special significance for Dr Simon Keogh, who leads the Met Office Satellite Data Products and Systems group. He said: "I spent the early part of my career working on sea-surface temperature measurements on a ship in the Bay of Biscay and English Channel as part of the ATSR validation effort. A lot has changed in the last 20 years, but the importance of the integrity of our sea-surface temperature records has remained paramount."



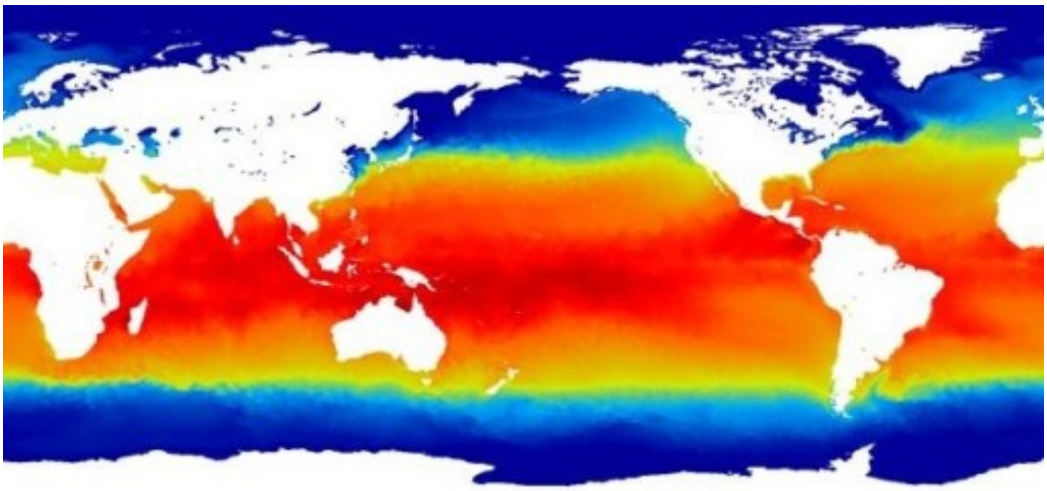
Left: An ATSR-1 thermal image of the English Channel and North Sea (showing in yellow and orange). Right: An ATSR-1 thermal image of the Mediterranean Sea showing highly variable surface temperature patterns between the Balearic Islands and the North African coast (bottom). (Imagery courtesy of Rutherford Appleton Laboratories)

To understand the need for the precision SLSTR delivers, we must understand what scientists are looking for in the climate data records. They can't wait 100 years to see what the climate will be like, so instead they're looking to confirm much smaller temperature changes over recent decades – decades

when we have been measuring sea temperatures so precisely from space. That's why the data gap between ATSR and SLSTR needs to be a short as possible. These series of satellite instruments provide indisputable, hard evidence of what is going on with the world's ocean temperatures.

Sea-surface temperatures are important because the ocean is actually a vast heat sink or 'thermal reservoir'. The ocean absorbs sunlight into its upper layer, storing it as heat and then transporting it around the world in vast currents. Energy is also exchanged between the ocean and atmosphere and sea ice. This redistributed energy drives ecosystems and physical and chemical cycles. It's this coupling between the sun and the ocean that makes our Earth habitable. You can think of the ocean as the Earth's 'solar panel', absorbing sunlight and transforming it into energy that ultimately powers the rest of the planet's life-support systems. Of course, the land also absorbs sunlight too but only at the surface where the energy is held less effectively. Satellites like Sentinel-3 are needed to provide a global picture of what is happening with our oceans.

Dr Keogh adds: "Our scientists' interest in sea-surface temperatures doesn't stop at monitoring our climate over a period of decades. This information drives ocean and weather models to predict future events. The Met Office OSTIA sea temperature and ice analysis is used to generate our world-leading weather forecasts. Accurate sea temperatures from satellites and other platforms are blended to provide a global snapshot of the temperature of our oceans."



An example of global sea surface temperature from the Met Office OSTIA analysis.

Sentinel-3 is important to the Met Office not only for the climate scientists wanting to know what will happen in future but also for today's meteorologists interested in what the weather will be doing in the coming week. The Sentinel-3 project comprises two satellites (3A and 3B) to be launched about a year apart. This pairing is due to provide an accurate continuation of the ATSR sea-surface temperature records for the coming decade, ensuring the continued integrity of our climate records.

EUMETSAT will be operating Sentinel-3 and providing the marine data, while the European Space Agency will be providing the land data. If you'd like to know more about Sentinel-3, which is scheduled for launch at 17:57 GMT today, please visit the European Space Agency web site here: http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-3.

The marine data from Sentinel 3 will be distributed by EUMETSAT. More details about EUMETSAT's role can be found here: http://www.eumetsat.int/website/home/Satellites/FutureSatellites/CopernicusSatellites/Sentinel3/index.htm

For more information about the Met Office ocean forecasting activities please visit our research web site: http://www.metoffice.gov.uk/research/weather/ocean-forecasting

Biography: Dr Simon Keogh leads the Met Office Satellite Data Products and Systems group. He is a member of a United Nations WMO expert team on Satellite Utilisation and Products and is the UK delegate to EUMETSAT's Operations Working Group.

http://www.metoffice.gov.uk/research/people/simon-j-keogh

Date Created
February 2016

Snow for parts of the UK

Description

UPDATED 17/02/2016

A frontal system interacting with cold air across the UK will bring a risk of wintry weather further south over the next 24 hours or so, with rain, sleet and snow in the forecast for some parts and also a risk of ice.

A slow moving weather front brought gale force winds and outbreaks of heavy rain across western Scotland on Tuesday. Overnight there was some snow across parts of Scotland and Northern Ireland and this band of rain with some sleet and snow will continue to move southeastwards through Wednesday. A number of Yellow National Severe Weather Warnings are in place.

Through daylight hours, some sleet and snow may affect upland parts of northern England and Wales, but as we move into Wednesday night and early Thursday, there is an increasing risk of a mix of rain, sleet and snow further south too. This is likely to affect some low-lying areas in central and eastern England, with a slushy covering in places, while a few centimetres may accumulate over higher ground such as the Lincolnshire Wolds and Chiltern Hills. Clear skies will follow from the northwest, with some wintry showers and a risk of ice

In these finely-balanced rain-snow situations there is often quite a lot of uncertainty surrounding the main areas to be affected, as well as how much will fall as rain and how much as snow. These wintry conditions could bring localised disruption to travel, so it’s a good idea to stay in touch with the forecasts and warnings on our website.

The weather front will gradually ease away southeastwards on Thursday, and after a brief quieter and still cold interlude the weather is expected to become generally more unsettled, and much milder, especially in southern parts.

Keep up to date with the latest forecast information and the National Severe Weather Warnings on our forecast pages, Facebook and Twitter sites and via our Weather App.

Date Created
February 2016

Fiji declares ‘state of natural disaster’ as Cyclone Winston batters islands

Description

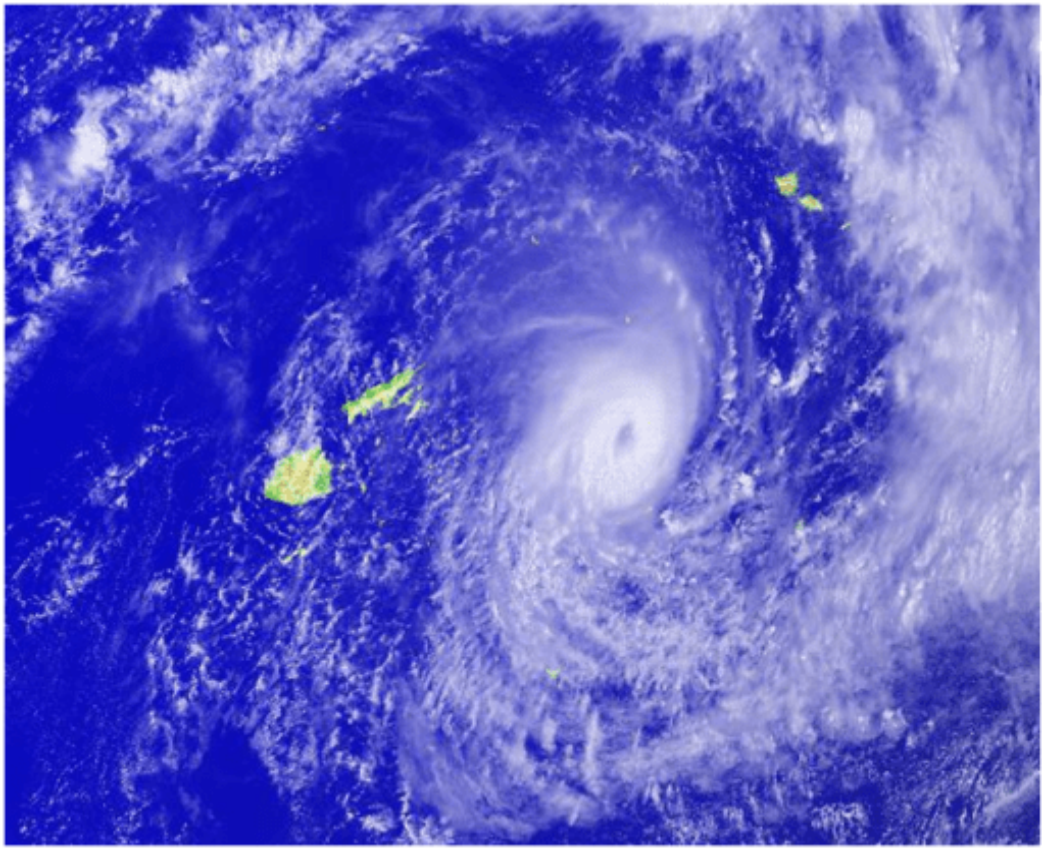
With the arrival of Tropical Cyclone Winston, the government of Fiji has declared a state of natural disaster and has imposed a curfew. Reports from Fiji suggest severe damage to towns and villages as 200mph gusts swept across the islands. Estimates suggest that nine out of 10 people on the islands are without electricity.

Tropical Cyclone Winston is believed to be the first Category 5 cyclone to reach the islands. The cyclone began to make landfall on the main islands of Fiji late on Saturday afternoon (local time).

All models indicate that Winston will travel towards the west on Sunday as a Category 5 cyclone, with further indications of a southward shift in direction, leading to a decrease in intensity as Winston approaches higher latitudes.

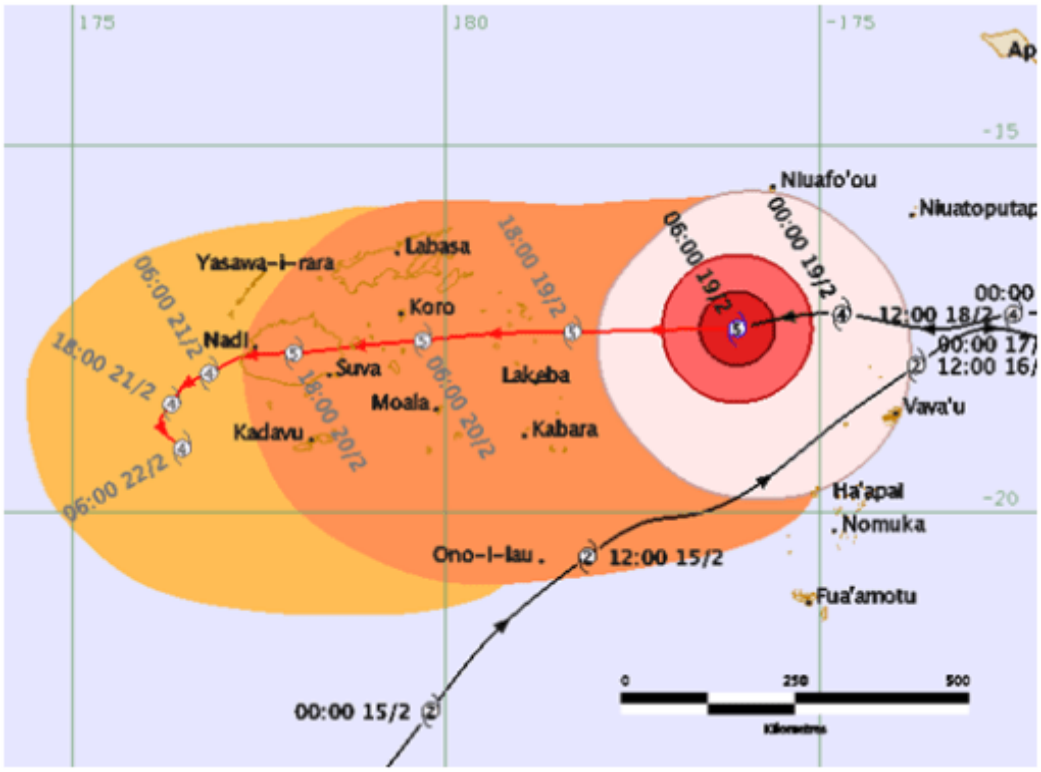
The southern hemisphere tropical cyclone season normally runs from November to April and so far this season’s activity in the South Pacific Ocean had been relatively low. Just two tropical cyclones have formed which have reached the equivalent of hurricane strength: Ula and Victor.

Around 10 days ago Tropical Storm Winston formed just to the east of Vanuatu in the South Pacific. The storm initially moved southwards passing to the west of Fiji with winds strengthening to more than 100 mph. Winston then started to weaken, but instead of continuing on a track towards higher latitudes, made an unusual turn north-eastwards. Despite weakening to a tropical storm as it did so Winston brought heavy rain to parts of Tonga earlier this week. Having stalled just south of Samoa, Winston then started to restrengthen and made another sharp turn towards the west.



Cyclone Winston at 0200 UTC on 19 February 2016.
Image courtesy of the National Institute of Informatics

Meteorologists will continue to monitor the track of Cyclone Winston and provide updates as more details are known. On Friday wind speeds averaged over 10 minutes were estimated to be near 125 mph near the centre of Winston with higher gusts, but following the cyclone's increasing intensity wind speeds of The forecast track took the centre of the cyclone initially across the smaller eastern islands of Fiji and eventually over its largest island of Viti Levu which includes the capital Suva. Winston is likely to maintain its current intensity and bring up to 400mm rain. With the combination of strong winds, heavy rain and storm surge the islands' authorities are fearing significant damage and destruction across the islands over the weekend.



Cyclone Winston forecast from the Fiji Meteorological Service, valid 0720 UTC.
Red line indicates most likely forecast track

Official warnings for the tropical cyclones in the South Pacific are produced by the Fiji Meteorological Service. The Met Office routinely supplies predictions of cyclone tracks from its global forecast model to regional meteorological centres worldwide, which are used along with guidance from other models in the production of forecasts and guidance. We also provide updates on current tropical storms via @metofficestorms on Twitter.

Date Created
February 2016

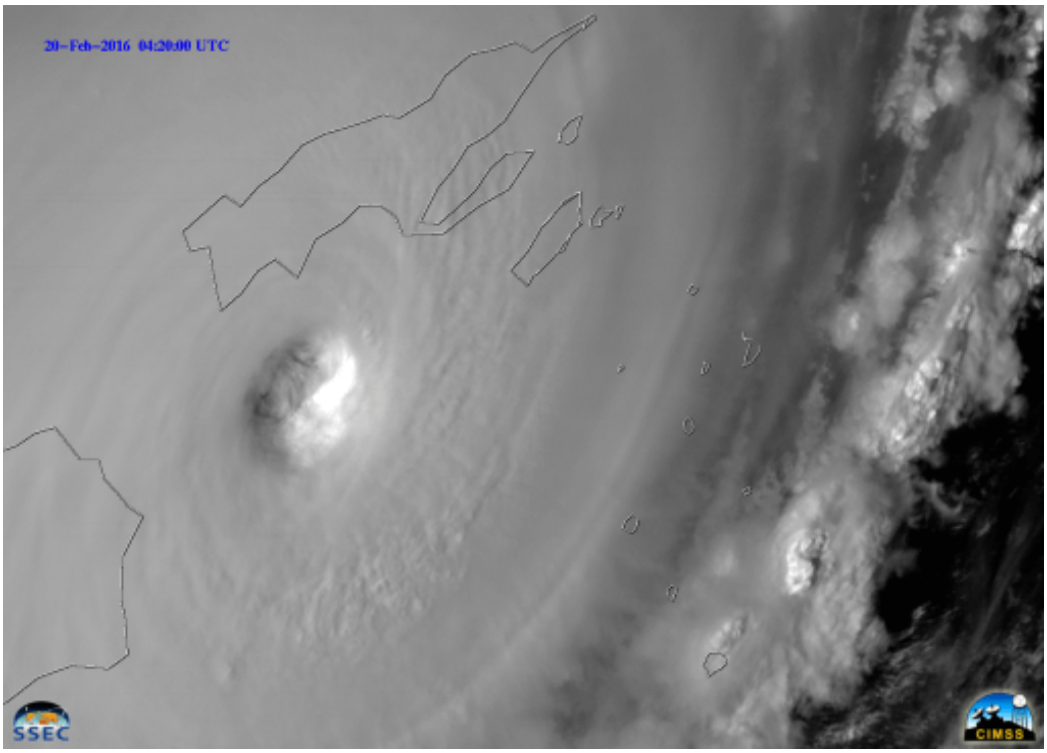
Cyclone Winston leaves a trail of destruction in Fiji

Description

Our blog on Friday 19 February reported the potential threat to Fiji from powerful Cyclone Winston. As predicted, the cyclone crossed the islands causing much destruction from exceptionally strong winds and heavy rain.

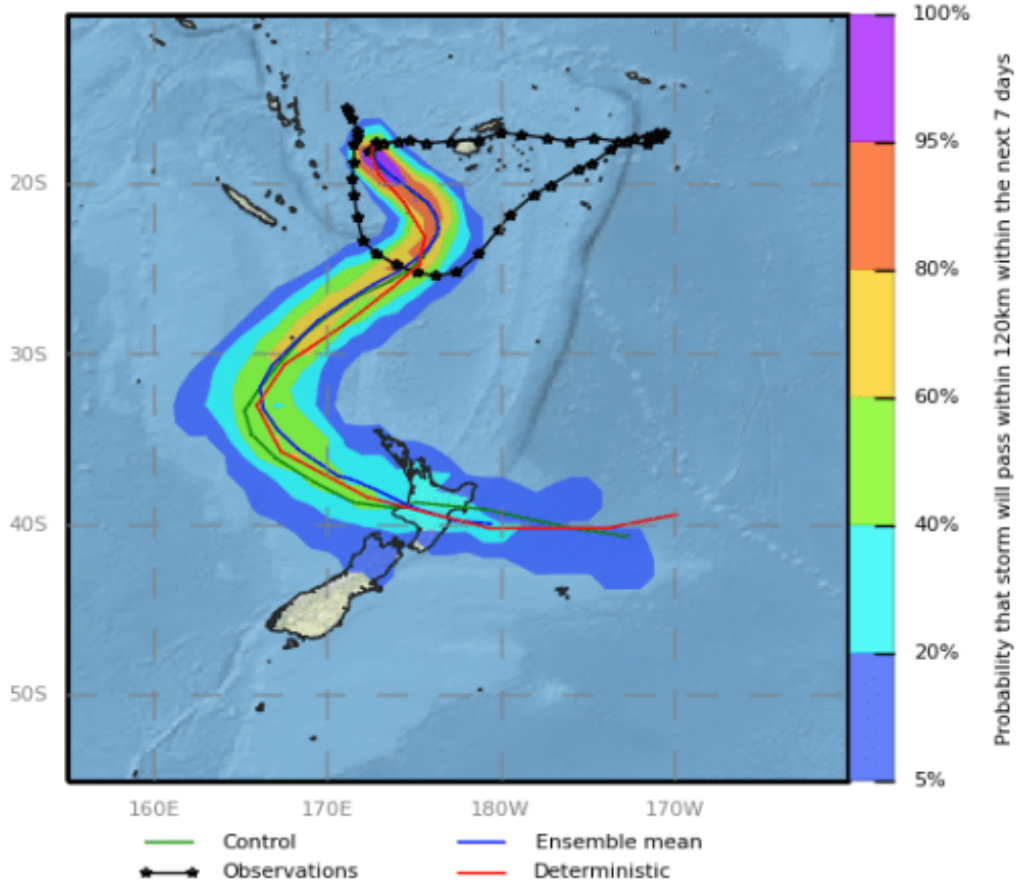
Late on Friday (UK time) Cyclone Winston crossed directly over the smaller Fijian islands of Vanua Balavu and Koro. At this stage, Winston was still strengthening and peaked with sustained winds averaged over 10-minutes estimated to be near 145 mph and gusts up to 200 mph. An observing station on the island of Vanua Levu recorded sustained winds of 121 mph on the northern side of the eye, which in this instance would have been the weaker side of the cyclone. Winston briefly made landfall on the northern coast of Fiji's largest island Viti Levu before moving back out to sea. The country's capital Suva is located on the southern coast, so received some shelter and did not experience the strongest winds. Available data indicates that Winston was the strongest cyclone on record to make landfall over the main island of Fiji and amongst the strongest on record in the whole southern hemisphere.

Reports are starting to emerge of severe destruction of property in communities located directly in the path of the cyclone and some loss of life. Relief agencies have been mobilised to provide aid and the New Zealand Air Force has been flying missions in the area to provide a picture of the damage in some of the more remote locations.



Cyclone Winston at 0420 UTC on 20 February 2016
Image courtesy of the CIMSS/SSEC, University of Wisconsin-Madison

Since leaving the shores of Fiji, Cyclone Winston has continued moving west and weakened, although is still a strong cyclone. Although there was a possibility that Winston could threaten Vanuatu, the cyclone is now starting to turn away from the islands and head initially south-east then south-west moving over open ocean for the next few days. The longer term forecasts from the Met Office ensemble forecasting system indicates that the post-tropical remnant of Cyclone Winston could pass over the North Island of New Zealand at the weekend. However, by then it would be much weakened and just bring a spell of wet and windy weather with no exceptional impacts, like those experienced on Fiji, expected.



Cyclone Winston strike probability forecast from the Met Office ensemble forecasting system

Official warnings for the tropical cyclones in the South Pacific are produced by the Fiji Meteorological Service. The Met Office routinely supplies predictions of cyclone tracks from its global forecast model to regional meteorological centres worldwide, which are used along with guidance from other models in the production of forecasts and guidance. We also provide updates on current tropical storms via @metofficestorms on Twitter.

Date Created
February 2016

Could sudden stratospheric warming bring a cold start to spring?

Description

Our atmospheric scientists are predicting a dramatic change in high altitude winds 50km above the ground and the imminent occurrence of an event known as a sudden stratospheric warming (SSW) in early March.

Professor Adam Scaife, Head of Monthly to Decadal Prediction explains: “Sudden stratospheric warming events occur high up in the atmosphere and involve a complete reversal of the high altitude polar jet stream – they can even affect weather at the surface, and for the UK a sudden stratospheric warming increases the risk of wintry weather.”

The phenomenon begins with a wave-like disturbance which travels up into the high-altitude jet stream. Scaife said: “This disturbance can grow to a point where it turns over and breaks, just like a wave on a beach.”

Normally the jet stream flows from west to east with some north and south oscillation, but the force from this high altitude disturbance pushes against the jet stream until the winds actually reverse and flow from east to west instead. Air then falls into the Arctic and is compressed so that it starts to warm: the temperature can rise by as much as 50C in just a few days.

Professor Scaife added: “This reversal of high altitude winds can also burrow down into the lower stratosphere. Once it is within reach of weather systems in the lower atmosphere the Atlantic jet stream often weakens and moves south. This allows cold air from the east into northern Europe and the UK.”

Sudden stratospheric warming events occur on average every couple of years and our long-range forecasts have consistently suggested an increased risk of sudden stratospheric warming towards the end of this winter. The last big event was in early 2013 and was followed by a cold end to winter. Although the impact of the current event is unlikely to be as severe, it increases the risk of cold north easterlies and wintry weather for the UK over the next few weeks.

Does this mean we’ll see snow at Easter?
You may have seen in the media that we will see snow at Easter. At this stage it is too early to provide details about what the weather will bring for Easter. Beyond a week ahead we can’t say what will happen on specific days, but we can give an idea of what type of weather we can expect.

As always we are working with our customers such as easyJet and other major airlines, airports such as Heathrow and Gatwick, local councils, and energy providers, together with government partners in Highways England and Transport Scotland to ensure they are prepared for the current wintry conditions and whatever the weather may bring in the coming weeks.

Keep up to date with the latest 30-day forecast using our forecast pages.

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